Clean Cities
U.S. Department of Energy
HAMPTON ROADS

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AMERICAN ENERGY FOR TRANSPORTATION

NCC Inc.

Virginia Department of Mines Minerals and Energy

Virginia's Center for Innovative Technology

bp

Ford

Virginia Natural Gas

BAUER COMPRESSORS

www.hrccc.org

HAMPTON ROADS CLEAN CITIES COALITION

Virginia Hydrogen Economy Roundtable

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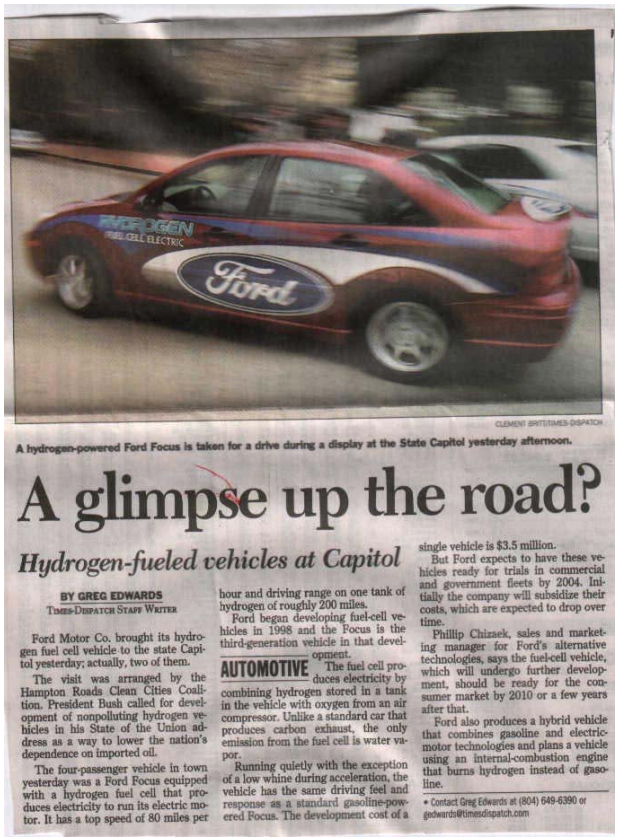
Education and Outreach, Exposure to Hydrogen and the Hydrogen Economy

Promotes and Coordinates Demonstrations (NPN Power Park, VT Power Park) , Generates Proposals, Seeks Funding



CLEMENT BRITT/TIMES-DISPATCH

A hydrogen-powered Ford Focus is taken for a drive during a display at the State Capitol yesterday afternoon.

A glimpse up the road?

Hydrogen-fueled vehicles at Capitol

BY GREG EDWARDS
TIMES-DISPATCH STAFF WRITER

Ford Motor Co. brought its hydrogen fuel cell vehicle to the state Capitol yesterday; actually, two of them.

The visit was arranged by the Hampton Roads Clean Cities Coalition. President Bush called for development of nonpolluting hydrogen vehicles in his State of the Union address as a way to lower the nation's dependence on imported oil.

The four-passenger vehicle in town yesterday was a Ford Focus equipped with a hydrogen fuel cell that produces electricity to run its electric motor. It has a top speed of 80 miles per hour and driving range on one tank of hydrogen of roughly 200 miles.

Ford began developing fuel-cell vehicles in 1998 and the Focus is the third-generation vehicle in that development.

AUTOMOTIVE The fuel cell produces electricity by combining hydrogen stored in a tank in the vehicle with oxygen from an air compressor. Unlike a standard car that produces carbon exhaust, the only emission from the fuel cell is water vapor.

Running quietly with the exception of a low whine during acceleration, the vehicle has the same driving feel and response as a standard gasoline-powered Focus. The development cost of a single vehicle is $3.5 million.

But Ford expects to have these vehicles ready for trials in commercial and government fleets by 2004. Initially the company will subsidize their costs, which are expected to drop over time.

Phillip Chizaek, sales and marketing manager for Ford's alternative technologies, says the fuel-cell vehicle, which will undergo further development, should be ready for the consumer market by 2010 or a few years after that.

Ford also produces a hybrid vehicle that combines gasoline and electric-motor technologies and plans a vehicle using an internal-combustion engine that burns hydrogen instead of gasoline.

• Contact Greg Edwards at (804) 649-6390 or gedwards@timesdispatch.com

March 7 Virginia Hydrogen Economy Roundtable – Ford Fuel Cell Demo

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H2 Power Park Concept

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Natural Gas - CH_4

H2Gen INNOVATIONS
Steam Methane Reformer

System Design and Analysis

Hydrogen – H_2

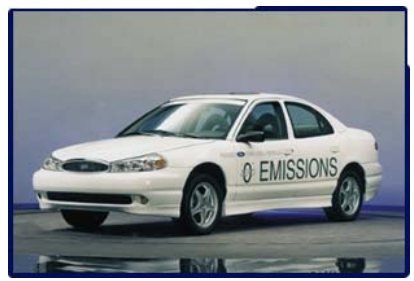
NASA
Merchant Market

Stationary Fuel Cell (PEM)

DC Power

DC-AC Inverter

AC Power Out



Fuel Cell Vehicles

NORTHROP GRUMMAN
Newport News

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H2 Power Park – Project Phases

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PHASE I: Conceptual Design	**9/03 – 3/04**
PHASE 2: Installation Design	**1/04 – 5/04**
PHASE 2.5: Industry Verification of Installation	**6/04 – 9/04**
PHASE 3: Component Procurement and Installation	**9/04 – 3/05**
PHASE 4: Operation	**4/05**

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H2 Power Park – Status, 5/03

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Challenges:

- 50% Cost Share is very burdensome for “non-development” projects, enticement of future user partners
- Industry not yet committed to direct H2 stationary PEM development

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Virginia Tech Mini-Power Park Proposal

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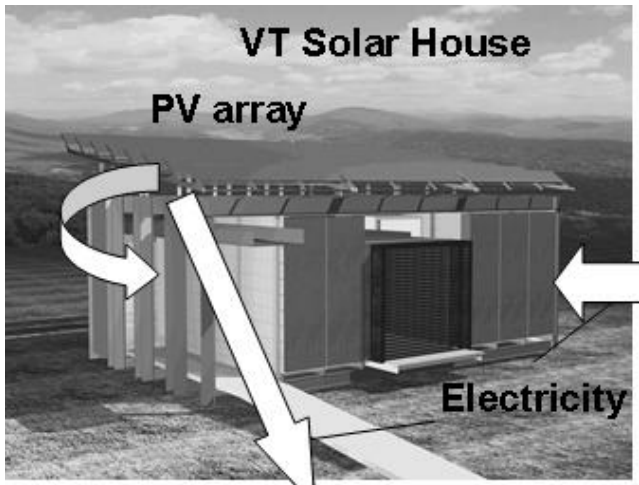
plug power



Hydrogen fuel cell

HEVT
Hybrid Electric Vehicle Team of Virginia Tech

Hydrogen fueled vehicle

H_2

H_2

H_2

Electrolyzer and high pressure gas compressor

High pressure gas storage and dispenser

stuartenergy
the power of hydrogen

Virginia Department of Mines Minerals and Energy

FutureTruck

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Virginia Tech Power Park – Status, 5/03

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Fully Renewable Hydrogen Production Demonstration

Education and Outreach Partners

- Virginia Tech Center for Coal and Energy Research
- Hampton Roads Clean Cities
- Virginia Tech Future Truck Team
- Virginia Tech Solar House Team

Funding application under review, State Energy Program Special Projects